Canceled Claims
and New Claims to be Entered

Claims 1 through 96 are cancelled

Claim 1. (Canceled) An automated system for tracking the movement of multiple objects within a predefined area comprising:

a fixed area tracking matrix for first detecting the motion of each object in (X, Y) space;

a first algorithm operated on a computer system responsive to the fixed area tracking matrix for determining the (X, Y) location of each object;

a movable volume tracking matrix responsive to the determined (X, Y) locations for controllably detecting the motion of each object in (X, Y, Z) space; and

a second algorithm operated on the computer system responsive to the movable volume tracking matrix for determining the (X, Y, Z) dimensional characteristics of each object and for forming a database representative of each object's locations, movements and dimensional characteristics.

Claim 2. (Canceled) The system of claim 1 further comprising:

one or more energy sources emitting non-visible energy that is detected by both the area and volume tracking matrices;

flat, visibly transparent markers adhered onto multiple locations on each object that reflect the non-visible energy; and

a third algorithm operated on the computer system responsive to the non-visible energy reflected off the markers for forming a database of related coordinates of each marker on each object.

Claim 3. (Canceled) The system of claim 1, wherein the objects are additionally identified, further comprising:

one or more energy sources emitting non-visible energy;

at least one flat, visibly transparent uniquely encoded marker adhered onto the top surface of each object that reflects the non-visible energy for detection by both the area and volume tracking matrices; and

a third algorithm operated on the computer system and responsive to the reflections off the at least one encoded marker detected by the area and volume tracking matrices for including into the database each object's identity along with its locations, movements, and dimensional characteristics.

Claim 4. (Canceled) The system of claim 1, wherein the objects are first identified and tracked in an outer area that is adjoining the predefined area and subsequently tracked as they enter and move about within the predefined area, further comprising:

one or more energy sources emitting non-visible energy throughout both the outer and predefined areas;

one unique marker or set of markers adhered onto each object that reflects the non-visible energy for detection by both the area and volume tracking matrices;

one or more outer area cameras set up to view the outer area responsive to the non-visible energy;

a third algorithm operated on the computer system responsive to the reflections off the unique marker or set of markers detected by the outer area cameras for forming a first database including the identity of each object as well as the object's changing location especially as the object enters the predefined area; and

a fourth algorithm operated on the computer system responsive to the area and volume tracking matrices modified to update the first database of object identity and changing location from the outer area to include additional

changing location information based upon each object's movements in the predefined area.

Claim 5. (Canceled) The system of claim 1 further comprising:

one or more energy sources emitting visible energy that is detected by both the area and volume tracking matrices;

spherical, visibly reflective markers adhered onto multiple locations on each object that reflect the visible energy; and

a third algorithm operated on the computer system responsive to the visible energy reflected off the markers for forming a database of related coordinates of each marker on each object.

Claim 6. (Canceled) The system of claim 1 further comprising:

one or more energy sources emitting non-visible energy that is detected by both the area and volume tracking matrices;

spherical markers adhered onto multiple locations on each object that reflect the non-visible energy; and

a third algorithm operated on the computer system responsive to the non-visible energy reflected off the markers for forming a database of related coordinates of each marker on each object.

Claim 7. (Canceled) An automated system for tracking the movement of multiple objects within a predefined area comprising:

one or more energy sources emitting non-visible energy;

flat, visibly transparent markers adhered onto multiple locations of each object that reflect the non-visible energy;

one or more cameras responsive to the reflected non-visible energy; and

a computer system responsive to the one or more cameras for forming a database of related coordinates of each marker on each object.

Claim 8. (Canceled) The system of claim 7 further comprising:

a fixed area tracking matrix for first detecting the motion of each object in (X, Y) space, wherein the computer system is responsive to the fixed area tracking matrix for determining the (X, Y) location of each object; and

a movable volume tracking matrix responsive to the determined (X, Y) locations for controllably detecting the motion of each object in (X, Y, Z) space, wherein the computer system is responsive to the movable volume tracking matrix for forming a database of related coordinates of each marker on each object.

Claim 9. (Canceled) The system of claim 7, wherein the objects are additionally identified, further comprising at least one flat, visibly transparent uniquely encoded marker adhered onto the top surface of each object that reflects the non-visible energy, and wherein the computer system is responsive to the reflections off the at least one encoded marker for including into the database each object's identity along with the related coordinates of each marker on each object.

Claim 10. (Canceled) The system of claim 7, wherein the objects are first identified and tracked in an outer area that is adjoining the predefined area and subsequently tracked as they enter and move about within the predefined area, further comprising:

at least one energy source emitting non-visible energy throughout the outer area;

one unique marker or set of markers adhered onto each object that reflects the non-visible energy; and

one or more outer area cameras set up to view the outer area that detect the non-visible energy, wherein the computer system is responsive to the reflections off the unique marker or set of markers detected by the outer area

cameras for forming a second database including the identity of each object as well as the object's changing location especially as the object enters the predefined area, and

the computer system updates the second database of object identity and changing location from the outer area to include additional related coordinates of each marker on each object from the predefined area.

Claim 11. (Canceled) An automated system for identifying multiple objects within a predefined area comprising:

one or more energy sources emitting non-visible energy;

at least one flat, visibly transparent uniquely encoded marker adhered onto the top surface of each object that reflects the non-visible energy;

one or more cameras responsive to the reflected non-visible energy; and

a computer system responsive to the one or more cameras for forming a database of identities of each object.

Claim 12. (Canceled) The system of claim 11 further comprising:

a fixed area tracking matrix for first detecting the motion of each object in (X, Y) space, wherein the computer system is responsive to the fixed area tracking matrix for determining the (X, Y) location of each object; and

a movable volume tracking matrix responsive to the determined (X, Y) locations for controllably detecting the motion of each object in (X, Y, Z) space, wherein the computer system is responsive to the movable volume tracking matrix for determining the (X, Y, Z) dimensional characteristics of each object and for forming a database representative of each object's movements and dimensional characteristics and associating these with the existing identities of each object.

Claim 13. (Canceled) The system of claim 11, wherein the objects are additionally tracked, further comprising flat, visibly transparent markers adhered onto multiple locations of each object that reflect the non-visible energy, wherein the computer system is responsive to the reflections off the flat markers, forms a database of related coordinates of each marker on each object, and associates these coordinates with the existing identities of each object.

Claim 14. (Canceled) The system of claim 11, wherein the objects are first identified and tracked in an outer area that is adjoining the predefined area and subsequently tracked as they enter and move about within the predefined area, further comprising:

one or more energy sources emitting non-visible energy throughout the outer area for reflection off the at least one unique marker; and

one or more outer area cameras set up to view the outer area responsive to the non-visible energy emitted throughout the outer area and reflected off the at least one unique marker, wherein the computer system is responsive to the reflections off the at least one unique marker detected by the outer area cameras for forming a second database including the identity of each object as well as the object's changing location especially as the object enters the predefined area, wherein

the computer system updates the second database of object identity and changing location from the outer area to include additional changing location information of each encoded marker from the predefined area.

Claim 15. (Canceled) An automated system for first identifying and tracking multiple objects in an outer area that is adjoining a predefined area and subsequently tracking those objects as they enter and move about within the predefined area, the system comprising:

one or more energy sources emitting non-visible energy throughout both the outer and predefined areas;

one unique marker or set of markers adhered onto each object that reflects the non-visible energy;

one or more outer area cameras responsive to the non-visible energy reflected off the markers while the objects are within the outer area;

one or more predefined area cameras responsive to the non-visible energy reflected off the markers while the objects are within the predefined area;

a first algorithm operated on a computer system responsive to the outer area cameras for forming a database including the identity of each object as well as the object's changing location especially as the object enters the predefined area; and

a second algorithm operated on the computer system responsive to the predefined area cameras for updating the existing database of object identity and changing location from the outer area to include additional changing location information based upon the object movements in the predefined area.

Claim 16. (Canceled) The system of claim 15 further comprising:

a fixed area tracking matrix for first detecting the motion of each object in (X, Y) space, wherein the computer system is responsive to the fixed area tracking matrix for determining the (X, Y) location of each object; and

a movable volume tracking matrix responsive to the determined (X, Y) locations for controllably detecting the motion of each object in (X, Y, Z) space.

Claim 17. (Canceled) The system of claim 15, wherein the objects are additionally tracked, further comprising flat, visibly transparent markers adhered onto multiple locations of each object that reflect the non-visible energy, wherein the computer system is responsive to the reflections off the flat markers, forms a database of related coordinates of each marker on each object, and associates these coordinates with the existing identities of each object.

Claim 18. (Canceled) The system of claim 15 wherein the one unique marker or set of markers further comprises at least one flat, visibly transparent uniquely encoded marker adhered onto the top surface of each object that reflects the non-visible energy.

Claim 19. (Canceled) An automated system for tracking the movement of multiple objects within a predefined area comprising:

one or more energy sources emitting visible energy;

visibly reflective markers adhered onto multiple locations of each object that reflect the visible energy;

a multiplicity of cameras responsive to the reflected visible energy; and

a computer system responsive to the multiplicity of cameras for forming a database of related coordinates of each marker on each object.

Claim 20. (Canceled) The system of claim 19 wherein the multiplicity of cameras comprises at least two fixed volume tracking cameras with at least partially overlapping fields-of-view for detecting the motion of each marker in (X, Y, Z) space.

Claim 21. (Canceled) The system of claim 20 wherein the multiplicity of cameras forms an ever larger total field-of-view by adding additional sets of two or more fixed volume tracking cameras whose individual fields-of-view partially overlap each other covering new volume space and partially overlap existing cameras.

Claim 22. (Canceled) An automated system for tracking the movement of multiple objects within a predefined area comprising:

one or more energy sources emitting non-visible energy;

visibly reflective markers adhered onto multiple locations of each object that also reflect the non-visible energy;

a multiplicity of cameras responsive to the reflected non-visible energy; and

a computer system responsive to the multiplicity of cameras for forming a database of related coordinates of each marker on each object.

Claim 23. (Canceled) The system of claim 22 wherein the multiplicity of cameras comprises at least two fixed volume tracking cameras with at least partially overlapping fields-of-view for detecting the motion of each marker in (X, Y, Z) space.

Claim 24. (Canceled) The system of claim 23 wherein the multiplicity of cameras forms an ever larger total field-of-view by adding additional sets of two or more fixed volume tracking cameras whose individual fields-of-view partially overlap each other covering new volume space and partially overlap existing cameras.

Claim 25. (Canceled) An automated system for identifying multiple objects within a predefined area comprising:

one or more energy sources emitting visible energy;

at least one visibly reflective uniquely encoded marker adhered onto the top surface of each object that reflects the visible energy;

a multiplicity of cameras responsive to the reflected visible energy; and

a computer system responsive to the multiplicity of cameras for forming a database of identities of each object.

Claim 26. (Canceled) The system of claim 25 wherein the multiplicity of cameras comprises at least two fixed volume tracking cameras with at least partially overlapping fields-of-view for detecting the motion of each marker in (X, Y, Z) space.

Claim 27. (Canceled) The system of claim 26 wherein the multiplicity of cameras forms an ever larger total field-of-view by adding additional sets of two or more fixed volume tracking cameras whose individual fields-of-view partially overlap each other covering new volume space and partially overlap existing cameras.

Claim 28. (Canceled) An automated system for identifying multiple objects within a predefined area comprising:

one or more energy sources emitting non-visible energy;

at least one visibly reflective uniquely encoded marker adhered onto the top surface of each object that also reflects the non-visible energy;

a multiplicity of cameras responsive to the reflected non-visible energy; and

a computer system responsive to the multiplicity of cameras for forming a database of identities of each object.

Claim 29. (Canceled) The system of claim 28 wherein the multiplicity of cameras comprises at least two fixed volume tracking cameras with at least partially overlapping fields-of-view for detecting the motion of each marker in (X, Y, Z) space.

Claim 30. (Canceled) The system of claim 19 wherein the multiplicity of cameras forms an ever larger total field-of-view by adding additional sets of two or more fixed volume tracking cameras whose individual fields-of-view partially overlap each other covering new volume space and partially overlap existing cameras.

Claim 31. (Canceled) An automated system for first identifying and tracking multiple objects in an outer area that is adjoining a predefined area and subsequently tracking those objects as they enter and move about within the predefined area, the system comprising:

one or more energy sources emitting visible energy throughout both the outer and predefined areas;

one unique marker or set of markers adhered onto each object that reflects the visible energy;

a multiplicity of outer area cameras responsive to the visible energy reflected off the markers while the objects are within the outer area;

a multiplicity of predefined area cameras responsive to the visible energy reflected off the markers while the objects are within the predefined area;

a first algorithm operated on a computer system responsive to the outer area cameras for forming a database including the identity of each object as well as

the object's changing location especially as the object enters the predefined area; and

a second algorithm operated on the computer system responsive to the predefined area cameras for updating the existing database of object identity and changing location from the outer area to include additional changing location information based upon the object movements in the predefined area.

Claim 32. (Canceled) The system of claim 31 wherein each multiplicity of cameras comprises at least two fixed volume tracking cameras with at least partially overlapping fields-of-view for detecting the motion of each marker in (X, Y, Z) space.

Claim 33. (Canceled) The system of claim 32 wherein each multiplicity of cameras forms an ever larger total field-of-view by adding additional sets of two or more fixed volume tracking cameras whose individual fields-of-view partially overlap each other covering new volume space and partially overlap existing cameras.

Claim 34. (Canceled) An automated system for tracking the movement of multiple objects within a predefined area comprising:

a first set of cameras forming a fixed area tracking matrix for first detecting the motion of each object in (X, Y) space;

a first algorithm operated on a computer system responsive to the first set of cameras for determining the (X, Y) location of each object;

a second set of cameras forming a movable volume tracking matrix responsive to the determined (X, Y) locations from the first algorithm for controllably detecting the motion of each object in (X, Y, Z) space; and

a second algorithm operated on the computer system responsive to the second set of cameras for determining the (X, Y, Z) dimensional characteristics of each object and for forming a database representative of each object's locations, movements and dimensional characteristics.

Claim 35. (Canceled) The system of claim 34 wherein the combined fields-of-view from all cameras in the first set of cameras form a single contiguous and approximately coplanar field-of-view that is substantially parallel to the ground surface within the tracking area.

Claim 36. (Canceled) The system of claim 35 further comprising:

one or more energy sources emitting non-visible energy that is detected by both the first set of area tracking cameras and the second set of volume tracking cameras;

markers adhered onto multiple locations on each object that reflect the non-visible energy; and

a third algorithm operated on the computer system responsive to the non-visible energy reflected off the markers for forming a database of related coordinates of each marker on each object.

Claim 37. (Canceled) The system of claim 36 wherein the markers are visibly transparent.

Claim 38. (Canceled) The system of claim 37, wherein the objects are additionally identified, further comprising:

at least one uniquely encoded marker adhered onto the top surface of each object that reflects the non-visible energy; and

a forth algorithm operated on the computer system and responsive to the non-visible energy reflected off the encoded markers for including into the database each object's identity along with its related coordinates.

Claim 39. (Canceled) The system of claim 38 wherein the uniquely encoded markers are visibly transparent.

Claim 40. (Canceled) The system of claim 34 further comprising:

one or more energy sources emitting non-visible energy that is detected by both the first set of area tracking cameras and the second set of volume tracking cameras;

markers adhered onto multiple locations on each object that reflect the non-visible energy; and

a third algorithm operated on the computer system responsive to the non-visible energy reflected off the markers for forming a database of related coordinates of each marker on each object.

Claim 41. (Canceled) The system of claim 40 wherein the markers are visibly transparent.

Claim 42. (Canceled) The system of claim 41, wherein the objects are additionally identified, further comprising:

at least one uniquely encoded marker adhered onto the top surface of each object that reflects the non-visible energy; and

a forth algorithm operated on the computer system and responsive to the non-visible energy reflected off the encoded markers for including into the database each object's identity along with its related coordinates.

Claim 43. (Canceled) The system of claim 42 wherein the uniquely encoded markers are visibly transparent.

Claim 44. (Canceled) A method for tracking the movement of multiple whole objects within a predefined area, where each whole object may further comprise connected movable parts that may also be tracked, comprising the steps of:

attaching at least one marker onto each whole object and to each part of each whole object to be tracked;

first detecting and tracking the location of at least one marker, attached to each whole object, in (X, Y) space relative to the surface of object movement;

using the tracked (X, Y) locations of each whole object to direct one or more movable cameras cable of focusing on any and each selected whole object, in order to second detect and track the (X, Y, Z) locations of as many markers as possible on the tracked whole object's attached parts;

forming a database of tracked (X, Y) coordinates for each whole object and (X, Y, Z) coordinates for each marked part of each whole object, the database of which may then be used to determine the continuous location, orientation, acceleration and velocity of each tracked whole object and it's parts.

Claim 45. (Canceled) The method of claim 44 wherein the step for first detecting and tracking the location of at least one marker attached to each whole object further comprises:

arranging a first set of cameras into a regular configuration such that their combined fields-of-view form a single contiguous coplanar field-of-view that is substantially parallel to the ground surface within the tracking area, and

using the combined images captured by the first set of cameras to first detect and track at least one marker, attached to each whole object, in (X, Y) space relative to the surface of object movement.

Claim 46. (Canceled) The method of claim 45, wherein the attached markers specifically reflect a narrow band of non-visible energy, further comprising the steps of:

using one or more energy sources to emit throughout the tracking area non-visible energy matching the narrow band specifically reflected by the markers, and

using cameras in both the first fixed set and second movable set that are at least capable of detecting the non-visible energy reflected off the attached markers.

Claim 47. (Canceled) The method of claim 46, wherein the attached markers specifically and only reflect a narrow band of non-visible energy and are therefore substantially transparent to visible energy.

Claim 48. (Canceled) The method of claim 47, wherein at least one marker attached to each whole object is placed to be in consistent view of the first set of fixed cameras and is encoded to uniquely identify that whole object, further comprising the step of:

using the images captured by the first set of cameras to locate the encoded marker on each whole object thereby updating the database of tracked (X, Y) locations for each whole object to include that object's identity.

Claim 49. (Canceled) The method of claim 48, wherein the attached encoded markers specifically and only reflect a narrow band of non-visible energy and are therefore substantially transparent to visible energy.

Claim 50. (Canceled) An automated system for tracking the movement of one or more objects within a predefined area based upon computer analysis of captured video images and not requiring user intervention, comprising:

a first set of stationary cameras for generating a first video stream of images that together form a contiguous and continuous view of the predefined area;

a first algorithm operated on a computer system responsive to the first stream of video images for analyzing those images to first determine the relative X, Y coordinates and the dimensional characteristics of at least the size of each object within the predefined area and for forming a tracking database representative of each object's coordinates, movements and dimensional characteristics;

a second set of movable cameras responsive to the tracking database, wherein each movable camera is automatically directed without user intervention to maintain an independent view of one or more objects within the predefined area and where the second set of movable cameras continuously outputs a second stream of video images, and

a second algorithm operated on a computer system responsive to the second stream of video images for determining additional relative X, Y and Z coordinates and the dimensional characteristics of at least the size of each object and for updating the tracking database.

Claim 51. (Canceled) The system of claim 50 wherein the contiguous view formed by the first set of stationary cameras is substantially parallel to the ground surface within the predefined area.

Claim 52. (Canceled) The system of claim 51 further comprising:

markers adhered onto one or more locations on each object to be tracked within the predefined area that reflect, retroreflect or fluoresce energy, and

a third algorithm operated on a computer system responsive to the energy reflecting, retroreflecting or fluorescing off the markers for updating the tracking database with related X, Y and Z coordinates of each marker matched to each marked object.

Claim 53. (Canceled) The system of claim 52 wherein the markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent, further comprising:

one or more energy sources emitting non-visible energy that is reflected or retroreflected, or emitting energy that is fluoresced by the markers and is detectable by both the first set of stationary cameras and the second set of movable cameras.

Claim 54. (Canceled) The system of claim 53, wherein the objects are additionally identified, further comprising:

at least one uniquely encoded marker adhered onto a top surface of each object to be identified that reflects, retroreflects or fluoresces energy, and

a forth algorithm operated on a computer system for locating and recognizing the encoded markers within either the first or second stream of video images and for updating the tracking database with each object's identity matched to its coordinates.

Claim 55. (Canceled) The system of claim 54 wherein the uniquely encoded markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent.

Claim 56. (Canceled) The system of claim 50 further comprising:

markers adhered onto one or more locations on each object to be tracked within the predefined area that reflect, retroreflect or fluoresce energy, and

a third algorithm operated on a computer system responsive to the energy reflecting, retroreflecting or fluorescing off the markers for updating the tracking database with related X, Y and Z coordinates of each marker matched to each marked object.

Claim 57. (Canceled) The system of claim 56 wherein the markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent, further comprising:

one or more energy sources emitting non-visible energy that is reflected or retroreflected, or emitting energy that is fluoresced by the markers and is detectable by both the first set of stationary cameras and the second set of movable cameras.

Claim 58. (Canceled) The system of claim 57, wherein the objects are additionally identified, further comprising:

at least one uniquely encoded marker adhered onto a top surface of each object to be identified that reflects, retroreflects or fluoresces energy, and

a forth algorithm operated on a computer system for locating and recognizing the encoded markers within either the first or second stream of video images and for updating the tracking database with each object's identity matched to its coordinates.

Claim 59. (Canceled) The system of claim 58 wherein the uniquely encoded markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent.

Claim 60. (Canceled) The system of claim 50 for tracking the movement of two or more objects, wherein the second set of moveable cameras comprises at least two cameras and wherein the second set is additionally directed to automatically reassign any one or more cameras following any one or more objects to follow a different one or more objects based upon which camera views may currently be blocked by one object in front of another with respect to any camera view.

Claim 61. (Canceled) An automated system for controlling some combination of at least the pan, tilt and/or zoom controls of one or more second movable cameras as they video the activities of one or more objects in a predefined area, where the control signals directing the second movable cameras are automatically generated without user intervention and based upon computer analysis of video images captured by one or more first stationary cameras that together form a contiguous and continuous view of the same area, comprising:

a first set of stationary cameras for generating a first video stream of images that together form a contiguous and continuous view of the predefined area;

a first algorithm operated on a computer system responsive to the first stream of video images for analyzing those images to first determine the relative X, Y coordinates and the dimensional characteristics of at least the size of each object within the predefined area and for forming a tracking database representative of each object's coordinates, movements and dimensional characteristics, and

a second set of movable cameras responsive to the tracking database, wherein each movable camera is automatically directed without user intervention to maintain an independent view of one or more objects within the predefined area and where the second set of movable cameras continuously outputs a second stream of video images.

Claim 62. (Canceled) The system of claim 61 wherein the second video stream is analyzed by a second algorithm operated on a computer system to determine additional relative X, Y and Z coordinates and the dimensional characteristics of at least the size of each object and for updating the tracking database.

Claim 63. (Canceled) The system of claim 62 wherein the contiguous view formed by the first set of stationary cameras is substantially parallel to the ground surface within the predefined area.

Claim 64. (Canceled) The system of claim 63 further comprising:

markers adhered onto one or more locations on each object to be tracked within the predefined area that reflect, retroreflect or fluoresce energy, and

a third algorithm operated on a computer system responsive to the energy reflecting, retroreflecting or fluorescing off the markers for updating the tracking database with related X, Y and Z coordinates of each marker matched to each marked object.

Claim 65. (Canceled) The system of claim 64 wherein the markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent, further comprising:

one or more energy sources emitting non-visible energy that is reflected or retroreflected, or emitting energy that is fluoresced by the markers and is detectable by both the first set of stationary cameras and the second set of movable cameras.

Claim 66. (Canceled) The system of claim 65, wherein the objects are additionally identified, further comprising:

at least one uniquely encoded marker adhered onto a top surface of each object to be identified that reflects, retroreflects or fluoresces energy, and

a forth algorithm operated on a computer system for locating and recognizing the encoded markers within either the first or second stream of video images and for updating the tracking database with each object's identity matched to its coordinates.

Claim 67. (Canceled) The system of claim 66 wherein the uniquely encoded markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent.

Claim 68. (Canceled) The system of claim 61 further comprising:

markers adhered onto one or more locations on each object to be tracked within the predefined area that reflect, retroreflect or fluoresce energy, and

a third algorithm operated on a computer system responsive to the energy reflecting, retroreflecting or fluorescing off the markers for updating the tracking database with related X, Y and Z coordinates of each marker matched to each marked object.

Claim 69. (Canceled) The system of claim 68 wherein the markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent, further comprising:

one or more energy sources emitting non-visible energy that is reflected or retroreflected, or emitting energy that is fluoresced by the markers and is detectable by both the first set of stationary cameras and the second set of movable cameras.

Claim 70. (Canceled) The system of claim 69, wherein the objects are additionally identified, further comprising:

at least one uniquely encoded marker adhered onto a top surface of each object to be identified that reflects, retroreflects or fluoresces energy, and

a forth algorithm operated on a computer system for locating and recognizing the encoded markers within either the first or second stream of video images and for updating the tracking database with each object's identity matched to its coordinates.

Claim 71. (Canceled) The system of claim 70 wherein the uniquely encoded markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent.

Claim 72. (Canceled) The system of claim 61 for tracking the movement of two or more objects, wherein the second set of moveable cameras comprises at least two cameras and wherein the second set is additionally directed to automatically reassign any one or more cameras following any one or more objects to follow a different one or more objects based upon

which camera views may currently be blocked by one object in front of another with respect to any camera view.

Claim 73. (Canceled) A method for tracking the movement of one or more objects within a predefined area based upon computer analysis of captured video images and not requiring user intervention, comprising the steps of:

capturing a continuous first stream of video images using a first set of stationary cameras, wherein the images together form a contiguous and continuous view of the predefined area;

detecting the X, Y coordinates and the dimensional characteristics of at least the size of each object relative to the predefined area using computer based image analysis of the first stream of video images;

using the detected X, Y coordinates and dimensional characteristics regarding each object to automatically and individually direct some combination of at least the pan, tilt and/or zoom movements of a each camera in a second set of one or more movable cameras without the aid of an user;

capturing a continuous second stream of video images using the second set of automatically movable cameras, wherein the images create independent views of one or more of the objects within the predefined area;

detecting additional X, Y and Z coordinates and the dimensional characteristics of at least the size of each object viewed using computer based image analysis of the second stream of video images, and

combining the information detected by image analysis of both the first and second video streams into a continuously updated tracking database indicating the relative X, Y and Z coordinates and dimensional characteristics of the objects relative to the predefined area.

Claim 74. (Canceled) The method of claim 73 wherein the contiguous view formed by the first set of stationary cameras is substantially parallel to the ground surface within the predefined area.

Claim 75. (Canceled) The method of claim 74 further comprising the steps of:

placing markers onto one or more locations on each object to be tracked that reflect, retroreflect or fluoresce energy;

detecting the reflected, retroreflected or fluroesced energy in order to determine the X, Y and Z coordinates of each marker using computer based image analysis of the first and second streams of video, and

updating the tracking database to indicate the relative X, Y and Z coordinates of the detected markers matched with the respective objects.

Claim 76. (Canceled) The method of claim 75 wherein the markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent, further comprising the step of:

using one or more energy sources to emit non-visible energy that is reflected or retroreflected, or energy that is fluoresced, throughout the predefined area that is detectable by both the first set of stationary cameras and the second set of movable cameras.

Claim 77. (Canceled) The method of claim 76, further comprising the steps of:

placing at least one uniquely encoded marker onto a top surface of each object to be identified that reflects, retroreflects or fluoresces energy;

detecting each unique identifier using computer based image analysis of the first and second streams of video without the aid of an user, and

updating the tracking database to indicate the identity of each object for which sufficient encoded markers were detected and decoded.

Claim 78. (Canceled) The method of claim 77 wherein the uniquely encoded markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent.

Claim 79. (Canceled) The method of claim 73 further comprising the steps of:

placing markers onto one or more locations on each object to be tracked that reflect, retroreflect or fluoresce energy;

detecting the reflected, retroreflected or fluoresced energy in order to determine the X, Y and Z coordinates of each marker using computer based image analysis of the first and second streams of video, and

updating the tracking database to indicate the relative X, Y and Z coordinates of the detected markers matched with the respective objects.

Claim 80. (Canceled) The method of claim 79 wherein the markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent, further comprising the step of:

using one or more energy sources to emit non-visible energy that is reflected or retroreflected, or energy that is fluoresced, throughout the predefined area that is detectable by both the first set of stationary cameras and the second set of movable cameras.

Claim 81. (Canceled) The method of claim 80, further comprising the steps of:

placing at least one uniquely encoded marker onto a top surface of each object to be identified that reflects, retroreflects or fluoresces energy;

detecting each unique identifier using computer based image analysis of the first and second streams of video, and

updating the tracking database to indicate the identity of each object for which sufficient encoded markers were detected and decoded.

Claim 82. (Canceled) The method of claim 81 wherein the uniquely encoded markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent.

Claim 83. (Canceled) The method of claim 73 for tracking the movement of two or more objects, wherein the step for using the detected X, Y coordinates and dimensional characteristics regarding each object to automatically and individually direct some combination of at least the pan, tilt and/or zoom movements of a each camera in a second set of one or more movable cameras further comprises the step of dynamically considering the location of each object with respect to the view of each camera and automatically reassigning any one or more cameras following any one or more objects to follow a different one or more

objects based upon which camera views may currently be blocked by one object in front of another with respect to any camera view.

Claim 84. (Canceled) A method for controlling some combination of at least the pan, tilt and/or zoom controls of one or more second movable cameras as they video the activities of one or more objects in a predefined area, where the control signals directing the second movable cameras are automatically generated without user intervention and based upon computer analysis of video images captured by one or more first stationary cameras that together form a contiguous and continuous view of the same area, comprising the steps of:

capturing a continuous first stream of video images using a first set of stationary cameras, wherein the images together form a contiguous and continuous view of the predefined area;

detecting the X, Y coordinates and dimensional characteristics of at least the size of each object relative to the predefined area using computer based image analysis of the first stream of video images;

using the detected X, Y coordinates and dimensional characteristics regarding each object to automatically and individually direct some combination of at least the pan, tilt and/or zoom movements of a each camera in a second set of one or more movable cameras without the aid of an user, and

capturing a continuous second stream of video images using the second set of automatically movable cameras, wherein the images create independent views of one or more of the objects within the predefined area.

Claim 85. (Canceled) The method of claim 84 further comprising the step of storing the detected X, Y coordinates and dimensional characteristics regarding each object in a tracking database.

Claim 86. (Canceled) The method of claim 85 wherein the contiguous view formed by the first set of stationary cameras is substantially parallel to the ground surface within the predefined area.

Claim 87. (Canceled) The method of claim 86 further comprising the steps of:

detecting additional X, Y and Z coordinates and dimensional characteristics of at least the size of each object viewed by using computer based image analysis on the second stream of video images, and

updating the tracking database with the additional X, Y and Z coordinates and dimensional characteristics from the analysis of the second video streams.

Claim 88. (Canceled) The method of claim 87 further comprising the steps of:

placing markers onto one or more locations on each object to be tracked that reflect, retroreflect or fluoresce energy;

detecting the reflected, retroreflected or fluoresced energy in order to determine the X, Y and Z coordinates of each marker using computer based image analysis of the first and second streams of video, and

updating the tracking database to indicate the relative X, Y and Z coordinates of the detected markers matched with the respective objects.

Claim 89. (Canceled) The method of claim 88 wherein the markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent, further comprising the step of:

using one or more energy sources to emit non-visible energy to be reflected or retroreflected, or energy to be fluoresced, throughout the predefined area that is detectable by both the first set of stationary cameras and the second set of movable cameras.

Claim 90. (Canceled) The method of claim 89, further comprising the steps of:

placing at least one uniquely encoded marker onto a top surface of each object to be identified that reflects, retroreflects or fluoresces energy;

detecting each unique identifier using computer based image analysis of the first and second streams of video, and

updating the tracking database to indicate the identity of each object for which sufficient encoded markers were detected and decoded.

Claim 91. (Canceled) The method of claim 90 wherein the uniquely encoded markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent.

Claim 92. (Canceled) The method of claim 84 further comprising the steps of:

placing markers onto one or more locations on one or more objects to be tracked that reflect energy;

detecting the reflected energy in order to determine the X, Y and Z coordinates of each marker using computer based image analysis of the first and second streams of video, and

updating the tracking database to indicate the relative X, Y and Z coordinates of the detected markers matched with the respective objects.

Claim 93. (Canceled) The method of claim 92 wherein the markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent, further comprising the step of:

using one or more energy sources to emit non-visible energy throughout the predefined area that is detectable by both the first set of stationary cameras and the second set of movable cameras.

Claim 94. (Canceled) The method of claim 93, further comprising the steps of:

placing at least one uniquely encoded marker onto a top surface of each object to be identified that reflects, retroreflects or fluoresces energy;

detecting each unique identifier using computer based image analysis of the first and second streams of video, and

updating the tracking database to indicate the identity of each object for which sufficient encoded markers were detected and decoded.

Claim 95. (Canceled) The method of claim 94 wherein the uniquely encoded markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent.

Claim 96. (Canceled) The method of claim 84 for tracking the movement of two or more objects, wherein the step for using the detected X, Y coordinates and dimensional characteristics regarding each object to automatically and individually direct some combination of at least the pan, tilt and/or zoom movements of a each camera in a second set of one or more movable cameras further comprises the step of dynamically considering the location of each object with respect to the view of each camera and automatically reassigning any one

or more cameras following any one or more objects to follow a different one or more objects based upon which camera views may currently be blocked by one object in front of another with respect to any camera view.

Please Enter New Claims 97 - 124

Claim 97. (New) A system for automatically videoing the activities of one or more participants and objects as they move about within a predefined area, during a predefined time, comprising:

a first set of two or more stationary cameras for generating a first video stream of images that together form a contiguous view of the predefined area, continuously throughout the predefined time, where the first video stream of images is exclusively responsible for providing the data necessary to determine the relative ongoing centriod X, Y location of each and every participant and object moving in the entire predefined area throughout the entire duration of tracking, regardless of the current centroid location of any one or more participants or objects within that area;

a first algorithm operated on a computer system responsive to the first stream of video images for simultaneously analyzing the continuous images from each first camera in order to first detect the presence of any one or more participants and / or objects within each and every camera's view and then to second determine each detected participant's and / or object's relative centroid X, Y location within that view, where dimensional characteristics of each detected participant and / or object, such as its size, may also be determined during the process, and third for continuously throughout the predefined time combining this determined information from each and every first set camera into a tracking database of at least the ongoing centroid X, Y coordinates of each one or more participants and objects, relative to the entire predefined area, and

a second algorithm operated on a computer system responsive to the tracking database both established and continuously updated exclusively using provided by the first set of cameras, for dynamically adjusting the current view of each one or more cameras in a second set of movable cameras, distinct from the first set of stationary cameras, wherein each movable camera is automatically directed without user intervention to maintain an independent view of one or more participants and / or objects, where the second set of movable cameras continuously outputs a second stream of video images, and where the second stream of video images is not used to either determine any participant's or object's centroid X, Y coordinates or to otherwise update the tracking database.

Claim 98. (New) The system of claim 97 for further providing a three dimensional model of the activities of at least the participants, comprising:

a third algorithm operated on a computer system responsive to the tracking database and both the first and second streams of video images for determining the ongoing relative X, Y and Z coordinates of one or more specific, non-centroid locations on each participant and for updating the tracking database to include the additional X, Y, Z coordinates of all detected locations.

Claim 99. (New) The system of claim 98 wherein the contiguous view formed by the first set of stationary cameras is substantially parallel to the ground surface within the predefined area.

Claim 100. (New) The system of claim 99 further comprising:

markers adhered onto one or more locations on each participant and / or object to be tracked that reflect, retroreflect or fluoresce energy, where the energy is detectable by the first and / or second set of cameras, and where the third algorithm now detects the adhered markers and updates the tracking database with related X, Y and Z coordinates of each detected marker for forming the three dimensional model of each participants activities.

Claim 101. (New) The system of claim 99 wherein the markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent, further comprising:

one or more energy sources emitting non-visible energy that is reflected or retroreflected off of the markers, or emitting energy that is fluoresced in the non-visible spectrum by the markers and is detectable by the first and / or second set of movable cameras.

Claim 102. (New) The system of claim 101, wherein the participants and / or objects are additionally identified, further comprising:

at least one uniquely encoded marker adhered onto a top surface of each participant and / or object to be identified that reflects, retroreflects or fluoresces energy, and

a forth algorithm operated on a computer system for locating and recognizing the encoded markers within either the first and / or second stream of video images and for

updating the tracking database with each participant's and / or object's identity matched to its coordinates.

Claim 103. (New) The system of claim 102 wherein the uniquely encoded markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent, further comprising:

one or more energy sources emitting non-visible energy that is reflected or retroreflected off of the markers, or emitting energy that is fluoresced in the non-visible spectrum by the markers and is detectable by the first and / or second set of movable cameras.

Claim 104. (New) The system of claim 97, wherein the participants and / or objects are additionally identified, further comprising:

at least one uniquely encoded marker adhered onto a top surface of each participant and / or object to be identified that reflects, retroreflects or fluoresces energy, and

a forth algorithm operated on a computer system for locating and recognizing the encoded markers within either the first or second stream of video images and for updating the tracking database with each participant's and / or object's identity matched to its coordinates.

Claim 105. (New) The system of claim 104 wherein the uniquely encoded markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent, further comprising:

one or more energy sources emitting non-visible energy that is reflected or retroreflected off of the markers, or emitting energy that is fluoresced in the non-visible spectrum by the markers and is detectable by the first and / or second set of movable cameras.

Claim 106. (New) The system of claim 97 for videoing the activities of two or more participants, wherein the second set of moveable cameras comprises at least two cameras and wherein the second set is additionally directed to automatically reassign any one or more cameras currently following any one or more participants to instead follow a different one or more participants based upon which camera views may currently be blocked by one participant in front of another.

Claim 107. (New) A system for automatically uniquely identifying and tracking one or more participants, including players and game officials, as well as game objects as they move about within a predefined playing area, during a predefined time such as a sports game, where there is at least one uniquely encoded marker adhered onto a top surface of each participant or object to be uniquely identified that reflects, retroreflects or fluoresces energy, comprising:

a first set of two or more stationary cameras for generating a first video stream of images that together form a contiguous view that entirely covers the playing area, where the first set of cameras capture video continuously throughout the entire game;

a first algorithm operated on a computer system responsive to the first stream of video images for simultaneously analyzing the continuous images from each first camera in order to detect the presence of any one or more participants and / or game objects within each and every camera's view, to determine each detected participant's and / or game object's relative centroid X, Y location within that view, to recognize the encoded markers adhered onto a top surface of each participant and / or object thereby determining each participant's and / or object's unique identity, where dimensional characteristics of each detected participant and / or game object, such as its size, may also be determined during the process, and for continuously throughout the entire game combining this determined information from each and every first set camera into a tracking database of at least the ongoing centroid X, Y coordinates of each one or more marked participants and / or game objects matched with their identities, as well as the ongoing centroid X, Y coordinates of one or more non-marked game objects, all relative to the entire playing area.

Claim 108. (New) The system of claim 107 for further automatically videoing the one or more participants as well as game objects as they move about within the predefined playing area, during the predefined time, further comprising:

a second algorithm operated on a computer system responsive to the tracking database, for dynamically adjusting the current view of each one or more cameras in a second set of movable cameras, distinct from the first set of stationary cameras, wherein each movable camera is automatically directed without user intervention to maintain an independent view of one or more participants and / or game objects,

where the second set of movable cameras continuously outputs a second stream of video images.

Claim 109. (New) The system of claim 108 for further providing a three dimensional model of the activities of at least the participants, where markers are adhered onto one or more locations on each participant and / or game objects to be modeled that reflect, retroreflect or fluoresce energy and where the energy is detectable by the first and / or second set of cameras, comprising:

a third algorithm operated on a computer system responsive to the tracking database and either or both the first and second streams of video images for first detecting the adhered markers and second updating the tracking database with related X, Y and Z coordinates of each detected marker for forming the three dimensional model of at least the participant's activities.

Claim 110. (New) The system of claim 109 wherein the markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent, further comprising:

one or more energy sources emitting non-visible energy throughout the playing area that is reflected or retroreflected off of the markers, or emitting energy throughout the playing area that is fluoresced in the non-visible spectrum by the markers and is detectable by the first and / or second set of movable cameras.

Claim 111. (New) A method for automatically videoing the activities of one or more participants and objects as they move about within a predefined area, during a predefined time, comprising the steps of:

capturing a first stream of video images using a first set of two or more stationary cameras, wherein the combined view from all first cameras covers the entire predefined area, and where each first camera provides images continuously throughout the predefined time;

simultaneously analyzing only the continuous images coming from each first camera in order to first detect the presence of any one or more participants and / or objects within each and every camera's view and then to second determine each detected participant's and / or object's relative centroid X, Y location within that view, where dimensional characteristics of each detected participant and / or object, such as its size,

may also be determined during this step, and third for continuously during the predefined time combining this determined information from each and every first set camera into a tracking database of at least the ongoing centroid X, Y coordinates of each one or more participants and objects, relative to the entire predefined area;

using the continuously determined centroid X, Y coordinates regarding each participant and object, as captured by the first set of cameras, to automatically and individually direct, without the aid of an user, some combination of at least the pan, tilt and/or zoom movements of a each camera in a second set of one or more movable cameras, distinct from the first set of stationary cameras, and

capturing a continuous second stream of video images using the second set of automatically movable cameras, wherein the images create independent views of one or more of the participants and / or objects within the predefined area.

Claim 112. (New) The method of claim 111 for further providing a three dimensional model of the activities of at least the participants, comprising the step of:

analyzing the tracking database and both the first and second streams of video images to determine the ongoing relative X, Y and Z coordinates of one or more specific, non-centroid locations on each participant and for updating the tracking database to include the additional X, Y, Z coordinates of all detected locations.

Claim 113. (New) The method of claim 112 wherein the contiguous view formed by the first set of stationary cameras is substantially parallel to the ground surface within the predefined area.

Claim 114. (New) The method of claim 113 further comprising the steps of:

placing markers onto one or more locations on each participant and / or object to be tracked that reflect, retroreflect or fluoresce energy;

detecting the reflected, retroreflected or fluoresced energy, using the first and / or second set of cameras, in order to further determine the X, Y and Z coordinates of each marker using computer based image analysis of the first and second streams of video, and

updating the tracking database to indicate the relative X, Y and Z coordinates of the detected markers matched with the respective participants and / or objects.

Claim 115. (New) The method of claim 114 wherein the markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent, further comprising the step of:

using one or more energy sources to emit non-visible energy throughout the predefined area, to be reflected or retroreflected off of the markers, or emitting energy that is fluoresced in the non-visible spectrum by the markers, where the non-visible energy is detectable by the first and / or second set of cameras.

Claim 116. (New) The method of claim 115, further comprising the steps of:

placing at least one uniquely encoded marker onto a top surface of each participant and / or object to be identified that reflects, retroreflects or fluoresces energy;

detecting each unique identifier using computer based image analysis of either the first and / or second streams of video, and

updating the tracking database to indicate the identity of each participant and / or object matched to its coordinates.

Claim 117. (New) The method of claim 116 wherein the uniquely encoded markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent, further comprising the step of:

using one or more energy sources to emit non-visible energy throughout the predefined area, to be reflected or retroreflected off of the markers, or emitting energy that is fluoresced in the non-visible spectrum by the markers, where the non-visible energy is detectable by the first and / or second set of cameras.

Claim 118. (New) The method of claim 111, further comprising the steps of:

placing at least one uniquely encoded marker onto a top surface of each participant and / or object to be identified that reflects, retroreflects or fluoresces energy;

detecting each unique identifier using computer based image analysis of either the first and / or second streams of video, and

updating the tracking database to indicate the identity of each participant and / or object matched to its coordinates.

Claim 119. (New) The method of claim 118 wherein the uniquely encoded markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent.

Claim 120. (New) The method of claim 111 for videoing the activities of two or more participants, wherein the second set of movable cameras comprising at least two or more cameras and the step for using the detected centroid X, Y coordinates and dimensional characteristics regarding each participant to automatically and individually direct some combination of at least the pan, tilt and/or zoom movements of a each second camera further comprises the step of dynamically considering the location of each participant with respect to the view of each second camera and automatically reassigning any one or more second cameras currently following any one or more participants to instead follow a different one or more participants based upon which camera views may currently be blocked by one participant in front of another.

Claim 121. (New) A method for automatically uniquely identifying and tracking one or more participants, including players and game officials, as well as game objects as they move about within a predefined playing area, during a predefined time such as a sports game, comprising the steps of:

placing at least one uniquely encoded marker adhered onto a top surface of each participant and / or game object to be uniquely identified, prior to the predefined time, that reflects, retroreflects or fluoresces energy;

generating a first video stream of images using a first set of two or more stationary cameras that together form a contiguous view that entirely covers the playing area, where the first set of cameras capture video continuously throughout the entire game;

simultaneously analyzing the continuous images from each first camera in order to detect the presence of any one or more participants and / or game objects within each and every camera's view, to determine each detected participant's and / or game object's relative centroid X, Y location within that view, to recognize the encoded markers adhered onto a top surface of each participant thereby determining each participant's unique identity, where dimensional characteristics of each detected participant and / or game object, such as its size, may also be determined during the process, and for continuously throughout the entire game combining this determined information from each and every first set camera into a tracking database of at least the ongoing centroid X, Y coordinates of each one or more marked participants and /

or game objects matched with their identities, as well as the ongoing centroid X, Y coordinates of one or more non-marked game objects, all relative to the entire playing area.

Claim 122. (New) The method of claim 121 for further automatically videoing the one or more participants as well as game objects as they move about within the predefined playing area, during the predefined time, further comprising the step of:

dynamically adjusting the current view of each one or more cameras in a second set of movable cameras, distinct from the first set of stationary cameras, wherein each movable camera is automatically directed based upon the tracking database without user intervention to maintain an independent view of one or more participants and / or game objects, where the second set of movable cameras continuously outputs a second stream of video images.

Claim 123. (New) The system of claim 122 for further providing a three dimensional model of the activities of at least the participants, further comprising the steps of:

adhering markers onto one or more locations on each participants and / or game objects to be modeled that reflect, retroreflect or fluoresce energy, where the energy is detectable by the first and / or second set of cameras, and

detecting the adhered markers within either or both the first and second streams of video images and updating the tracking database with related X, Y and Z coordinates of each detected marker for forming the three dimensional model of at least the participant's activities.

Claim 124. (New) The method of claim 123 wherein the markers reflect, retroreflect or fluoresce primarily non-visible energy and are therefore substantially visibly transparent, further comprising the step of:

using one or more energy sources to emit non-visible energy throughout the playing area that is reflected or retroreflected off of the markers, or emitting energy throughout the playing area that is fluoresced in the non-visible spectrum by the markers and is detectable by the first and / or second set of movable cameras.